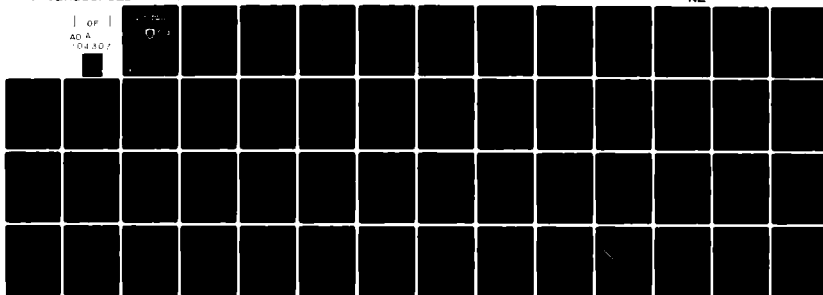


AD-A104 307 ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND DOVER--ETC F/6 5/1
TRAVEL COST COMPARISON BETWEEN POV, RENTAL CAR AND COMMAND AIRC--ETC(U)
JUN 81 R FIORE, F CAPRIGLIONE
UNCLASSIFIED ARRAC-81-2 NL

1 of 1
AD A
04.50.7



END
DATE
FILMED
10-81
DTIC

LEVEL II

(12)

**TRAVEL COST COMPARISON
BETWEEN POV, RENTAL CAR AND COMMAND AIRCRAFT**

AD A104307



DTIC
ELECTE
SEP 17 1981
S D
E

**PREPARED BY
MR. RON FIORE
MR. FRANK CAPRIGLIONE**

JUNE 1981

This document has been approved
for public release and sale; its
distribution is unlimited.

**COST ANALYSIS DIVISION
REQUIREMENTS AND ANALYSIS OFFICE**

DTIC FILE COPY


87 8 10 045

ARRAC-81-2

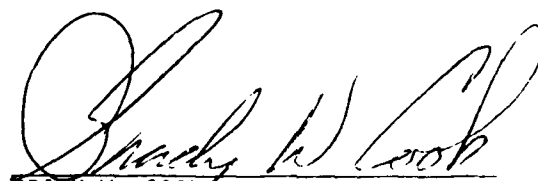
TRAVEL COST COMPARISON
BETWEEN POV,
RENTAL CAR AND COMMAND AIRCRAFT

Prepared by:

Mr. Ron Fiore
Mr. Frank Capriglione



ROBERT E. LEE
Chief, Cost Analysis Division
Requirements & Analysis Office



GRADY W. COOK
LTC(P), GS
C, Requirements & Analysis Office

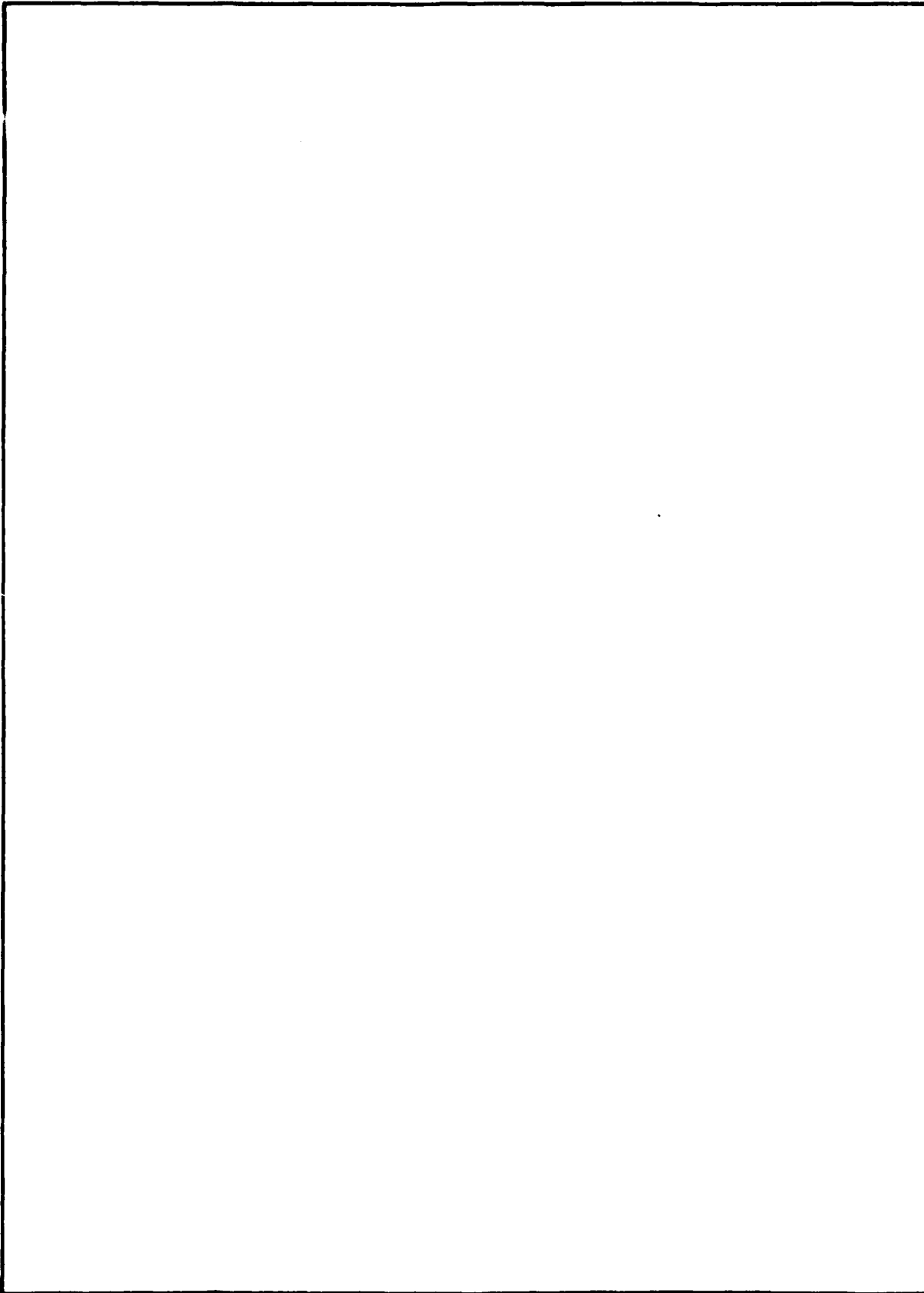
June 1981

DISCLAIMER

"The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation".

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER ARRAC-81-2	2. GOVT ACCESSION NO. AD A104307	3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) Travel Cost Comparison Between POV, Rental Car and Command Aircraft		5. TYPE OF REPORT & PERIOD COVERED Final	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Ron/Fiore Frank/Capriglione		8. CONTRACT OR GRANT NUMBER(s)	
9. PERFORMING ORGANIZATION NAME AND ADDRESS DRDAR-RAC ARRADCOM, Cost Analysis Division Dover, NJ 07801		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	
11. CONTROLLING OFFICE NAME AND ADDRESS (12) 531		12. REPORT DATE June 1981	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES	
		15. SECURITY CLASS. (of this report) Unclassified	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report)			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Travel Cost Comparison POV, Rental, YU21, C12D, UH1H 1-10 Passengers			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Travel costs to the government depend in part on mode of transportation used to TDY site. This report analyzes and compares the various means of traveling available to the employee on TDY. The level of detail extends to 2, 3 and 4 day trips as well as a 1 day meeting.			

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)



SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

SUMMARY

The study compares the cost to the government of TDY travel by POV, rental car and command aircraft. It considers various cases where the number of employees on TDY changes from 1 to 10 and where the scenario changes from Picatinny to Ft Monmouth, to Watervliet Arsenal, to APG, and to Washington, DC. Assumptions are made to lend credibility to the analysis.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	<i>Not on file</i>
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
<i>A</i>	

TABLE OF CONTENTS

	<u>Page No.</u>
Introduction	1
Scenario	1
Assumptions	1
Selection of TDY Locations for Study	1
Differences Between Modes of Transportation	2
Conclusions	
One Day Meetings	2
Two, Three & Four Day Meetings	3
Appendixes	
A - Supporting Rationale:	
Anal. I Trip to APG	5
Anal. II Trip to Watervliet	14
Anal. III Trip to Ft Monmouth	24
Anal. IV Trip to Washington DC Area	33
B - Graph of POV vs Rental Car	43
C - Data Sources	45
Distribution List	46

TABLES

	<u>Page No.</u>
1 Most economic mode of transportation for one day meeting	2
2 Most economic mode of transportation for 2, 3 and 4 day meetings	3

INTRODUCTION: The Cost Analysis Division has performed a study to determine the most cost effective mode of transportation between command aircraft, POV, and rental car. The details of the analysis (Appendix A) and results provided in the body allow for a speedy decision of the least expensive mode of transportation provided that the mission generally conforms to the scenario provided.

SCENARIO: The inclosed analysis involve a meeting to be held between 0900 hours and 1400 hours the same day. The meeting will require the presence of a number of employees from ARRADCOM ranging from one to ten. In addition, summary data is provided for meetings that extend to two, three and four days. In all cases, however, the scenario provided examines meetings that begin at 0900 hours of the first day and conclude business at 1400 hours of the last day.

ASSUMPTIONS:

(1) Travel by auto would necessitate arriving at TDY the night before the meeting when the TDY location was in excess of two hours driving time of ARRADCOM.

(2) When arriving at TDY site the night before the meeting, travelers would leave ARRADCOM at a time to allow arrival in TDY vicinity at approximately 1630 hours.

(3) When traveling by auto, no more than four employees will occupy one automobile.

(4) When traveling by command aircraft to meetings in excess of one day the aircraft would make an additional round trip in which no passengers are transported.

(5) When traveling by command aircraft to meetings in excess of one day to TDY sites where no government quarters are available rental cars would be authorized.

(6) Average distance from employees residence to ARRADCOM is approximately 15 miles.

SELECTION OF TDY LOCATIONS FOR STUDY: Four locations were selected for this study. Two of the trips (Watervliet Arsenal and Aberdeen Proving Ground) were chosen because both trips were within 150 to 200 mile range of HQ ARRADCOM and both required overnight accommodations when traveling by auto. In addition, the Aberdeen Proving Ground study offered a look at the impact on the cost comparison when government quarters were available while the Watervliet Arsenal study involved no government quarters. The analysis to Ft. Monmouth was selected because it offered a trip to a location that was within 100 miles of ARRADCOM and did not require an overnight stay when traveling by auto to a one day meeting. The trip to the Washington D.C. area was chosen because it involved a trip in excess of 200 miles and a location with a high frequency of TDY's. The inclosed analysis may be used as a reasonable alternative to performing repetitive analysis of related travel situations.

DIFFERENCES BETWEEN MODES OF TRANSPORTATION:

(1) POV vs. Rental Car - The cost of rental car is consistently greater to the government for two reasons: (a) The total mileage cost is greater (See Appendix B), and (b) there is a loss in employee productive time while picking up the rental car. It should be noted that the cost differential between these two alternatives is, in most cases, less than 10%. In every case where the POV is the most cost effective mode of transportation it can be replaced by the rental car as the second best choice for employees unable to use their own automobile.

(2) C12D aircraft vs. YU21 aircraft - The difference in cost to the government between use of these two fixed winged aircraft is minimal. For one passenger the cost difference was 5% for the Washington D.C. trip. For two passengers the difference was 4% and for 3 and 4 passengers the difference was 3%. This represented a cost difference of less than \$30 and is considered negligible. The cost difference for the APG and Watervliet trips were similar. It can be concluded from these small differences in cost that use of either aircraft for 1,2,3 and 4 passengers would result in approximately the same cost to the government.

CONCLUSIONS

(1) ONE DAY MEETINGS - The trips to areas requiring overnight stays, when traveling by auto, each came up with the same least expensive mode of transportation for the same specific number of travelers. The Ft. Monmouth trips, which did not require an overnight stay are slightly different. The following table summarizes the conclusions of the study for one day meetings.

Table 1. Most Economic Mode of Transportation for One Day Meetings

<u>Number of Passengers</u>	<u>Travel to Location Where Overnight Stay Is Required When Using Auto</u>	<u>Travel to Location Where Overnight Stay Is Not Required</u>
1	POV	POV
2	YU21	POV
3	YU21	POV
4	YU21	UH-1H
5	C12D	UH-1H
6	C12D	UH-1H
7	C12D	UH-1H
8	C12D	UH-1H
9	UH-1H	UH-1H
10	UH-1H	UH-1H

(2) TWO, THREE AND FOUR DAY MEETINGS - The following table summarizes the results of the study for 2, 3 and 4 day meetings.

Table 2. Most Economic Mode of Transportation for 2, 3 and 4 Day Meetings

Number of Passengers	Less Than* 100 Miles	150 - 200 Mile Range		Excess of 200 Miles
		BOQ	No BOQ	
1	POV	POV	POV	POV
2	POV	POV	POV	POV
3	POV	POV	POV	YU21
4	POV	YU21	POV	YU21
5	POV	C12D	C12D	C12D
6	POV	C12D	C12D	C12D
7	POV	C12D	C12D	C12D
8	POV	C12D	C12D	C12D
9	POV	UH-1H	POV	POV
10	POV	UH-1H	POV	POV

*Normally Fixed Winged aircraft will not be used for short trips unless airfield is located in immediate vicinity of TDY location.

APPENDIX A

SUPPORTING RATIONALE

ANALYSIS I

ARRADCOM (DOVER SITE)

TO

ABERDEEN PROVING GROUND (APG), MARYLAND

The following analyzes the costs involved in travel to a meeting at APG for a number of employees ranging from one to ten. This meeting will begin at 0900 hrs. and conclude business at 1400 hrs the same day. Costs of travel by Command aircraft, privately owned vehicle and rental car are considered. Assume travel by either mode of automobile will necessitate arriving at TDY the night before the meeting. The supporting rationale represents costs for each mode of transportation.

<u>Number of Passengers</u>	<u>POV</u>	<u>Rental Car</u>	<u>UH-1H</u>	<u>CI2D</u>	<u>YU21</u>
1	\$ 371	\$ 420	\$ 983	\$ 476	\$454
2	\$ 650	\$ 721	\$1096	\$ 573	\$550
3	\$ 924	\$1021	\$1210	\$ 669	\$646
4	\$1199	\$1321	\$1323	\$ 765	\$742
5	\$1570	\$1740	\$1437	\$ 861	N/A
6	\$1848	\$2042	\$1550	\$ 958	N/A
7	\$2123	\$2341	\$1664	\$1054	N/A
8	\$2398	\$2641	\$1777	\$1150	N/A
9	\$2769	\$3061	\$1891	N/A	N/A
10	\$3047	\$3362	\$2004	N/A	N/A

NOTE: Extrapolation of the data for 2, 3 and 4 day meetings indicates the least expensive mode of transportation for 1, 2 or 3 employees is by POV assuming all three employees are in the same POV. For 4 employees the least expensive is the YU21 Aircraft and the CI2D is the least expensive for 5, 6, 7 or 8 travelers. For 9 and 10 passengers the most cost effective single mode is the UH-1H helicopter. However, where schedules permit, a combination of the YU21 and CI2D aircraft is the least expensive for 9 or 10 passengers. An additional assumption for the 2, 3 and 4 day meetings is that the command aircraft would require an additional round trip where no passengers were transported.

SUPPORTING RATIONALE

ARRADCOM (Dover Site) to Aberdeen Proving Ground

1. PRIVATELY OWNED VEHICLE

Scenario

Driver alone or with one or more passengers leaves ARRADCOM 1230 hrs, day 1.

Arrive APG 1630 hrs, day 1.

Meeting 0900 hrs to 1400 hrs, day 2.

One Way Travel

180 mi

50 mi/hr = 4 hrs

Leave APG 1430 hrs, day 2.

Driver alone:

Mission Complete 1830 hrs, day 2.

Driver with 1 or more passengers:

Arrive ARRADCOM 1830 hrs, day 2 (drop off passengers).

Mission Complete 1915 hrs, day 2.

POV Mileage costs & tolls

ARRADCOM to APG & Return (approximately) 360 mi

In & Around TDY (approximately) 30 mi

Driver Alone: Total Miles 390 mi

Driver with 1 or more passengers:

ARRADCOM to home 15 mi

Total Miles 405 mi

Driver Alone 390 mi @ \$.225/mi \$ 87.75

Driver with 1 or more passengers
405 mi @ \$.225/mi \$ 91.13

Toll Cost (round trip) (approximately) \$ 9.00

Total Mileage cost & tolls

Driver Alone \$ 96.75

Driver with 1 or more passengers: \$100.13

Per Diem

APG has government quarters
available at a cost of \$5/day.

Per Diem rate \$28/day

6 quarters @ \$28/day \$42.00

Unproductive Duty Time

Day 1 (1230 hrs - 1630 hrs)	4.0 hrs
Day 2 (1400 hrs - 1630 hrs)	<u>2.5 hrs</u>
	6.5 hrs

Average Rate of Pay/Overhead for GS-9 - GS-15 ARRADCOM

Average Pay (Including Fringe)	= \$20.50/hr
Overhead	<u>\$15.30/hr</u>
Total	\$35.80/hr

Opportunity Cost of TDY

Unproductive time x Average Pay/Overhead GS9-GS15
6.5 hrs @ \$35.80/hr = \$232.70

<u>Private Vehicle 1</u>	<u>Per Diem</u>	<u>Mileage ^{1/} / Opportunity & Tolls</u>	<u>Cost TDY</u>	<u>Total NET \$</u>	<u>Total Cum \$</u>
Driver	\$42.00	\$96.75/100.13	\$232.70	\$371.45	\$ 371.45
Passenger 1	\$42.00	0	\$232.70	\$274.70	\$ 649.53
Passenger 2	\$42.00	0	\$232.70	\$274.70	\$ 924.23
Passenger 3	\$42.00	0	\$232.70	\$274.70	\$1198.93

Private Vehicle 2

Driver	\$42.00	\$96.75/100.13	\$232.70	\$371.45	\$1570.38
Passenger 1	\$42.00	0	\$232.70	\$274.70	\$1848.46
Passenger 2	\$42.00	0	\$232.70	\$274.70	\$2123.16
Passenger 3	\$42.00	0	\$232.70	\$274.70	\$2397.86

Private Vehicle 3

Driver	\$42.00	\$96.75/100.13	\$232.70	\$371.45	\$2769.31
Passenger 1	\$42.00	0	\$232.70	\$274.70	\$3047.39

1/ Return mileage cost for driver will depend on presence of passengers in his car necessitating a stop at ARRADCOM before proceeding home.

2. RENTAL CAR

Scenario

Driver alone or with 1 or more passengers leaves ARRADCOM for rental agency in POV at 1130 hrs, day 1.

Leaves rental agency at 1200 hrs, day 1.

Arrives APG at 1630 hrs, day 1.

Meeting 0900 hrs to 1400 hrs, day 2.

Leaves APG at 1430 hrs, day 2.

Arrives rental agency at 1830 hrs, day 2. Driver alone:

Mission complete 1900 hrs, day 2.

Driver with 1 or more passengers:

Arrive ARRADCOM 1900 hrs, day 2 (drop off passengers).

Mission complete 1930 hrs, day 2.

Mileage Costs, Tolls, Gasoline, Rental Costs

Rental Mileage Cost

Rental agency to APG & Return (approximately)	360 mi
In & Around TDY (approximately)	30 mi
Total Rental car mileage	390 mi

Rental Rate at Salerno Pontiac \$19.95/day

Mileage Rental rate \$.19/mi after 100 mi/day

Rental Mileage Cost (2 days)

(390 mi - 200 mi) @ \$.19/mi \$36.10

Base Rental Cost 2 days = @ \$19.95/day \$39.90

New Jersey Sales Tax \$ 3.80

Gasoline Cost 390 mi \$1.35/gal \$26.33

20 mi/gal

Total Rental Cost \$106.13

POV Mileage Cost 1/

Driver

23/31 mi

23/31 mi @ \$.225/mi = \$5.18/\$6.98

Tolls (round trip) (approximately) \$9.00

Total POV/Rental Car Cost

Driver \$106.13 + \$5.18/\$6.98 + \$9.00 = \$120.31/122.11

Per Diem

7 quarters @ \$28/day = \$49.00

1/ Actual POV mileage will depend on presence of passengers necessitating stop at ARRADCOM before proceeding home.

Unproductive Duty Time

Day 1 (1130 - 1630)	4.5 hrs
Day 2 (1400 - 1630)	2.5 hrs
	<u>7.0 hrs</u>

Average Rate of Pay/Overhead for GS9 - GS 15 ARRA DCOM

\$35.80/hr

Opportunity Cost of TDY

7.0 hrs @\$35.80/hr = \$250.60

<u>Rental Vehicle 1</u>	<u>Per Diem</u>	<u>Rental Car, POV, Mileage, Gas, Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
Driver	\$49.00	\$120.31/122.11	\$250.60	\$419.91	\$ 419.91
Passenger 1	\$49.00	0	\$250.60	\$299.60	\$ 721.31
Passenger 2	\$49.00	0	\$250.60	\$299.60	\$1020.91
Passenger 3	\$49.00	0	\$250.60	\$299.60	\$1320.51

Rental Vehicle 2

Driver	\$49.00	\$120.31/122.11	\$250.60	\$419.91	\$1740.42
Passenger 1	\$49.00	0	\$250.60	\$299.60	\$2041.82
Passenger 2	\$49.00	0	\$250.60	\$299.60	\$2341.42
Passenger 3	\$49.00	0	\$250.60	\$299.60	\$2641.02

Rental Vehicle 3

Driver	\$49.00	\$120.31/122.11	\$250.60	\$419.91	\$3060.93
Passenger 1	\$49.00	0	\$250.60	\$299.60	\$3362.33

3. AIRCRAFT

A. Travel by UH-1H helicopter, seating capacity -10.

Scenario

Leave home in POV at 0545 hrs, day 1.
Arrive Morristown Airport at 0615 hrs, day 1.
Leave Morristown Airport in UH-1H at 0630 hrs, day 1.
Arrive APG at 0800 hrs, day 1.
Meeting at 0900 hrs to 1400 hrs, day 1.
Leave APG at 1430 hrs, day 1.
Arrive Morristown Airport at 1600 hrs, day 1.
Mission Complete at 1630 hrs, day 1.

Aircraft Costs

Morristown Airport to APG (Phillips Army Airfield)
120 nautical miles in 1.6 hrs (one way) @\$265/hr = \$424
2 trips @ \$424./trip = \$848

Mileage Costs

POV mileage cost to Morristown Airport & Return
(approximately) 30 mi @\$.225/mi = \$6.75

The UH-1H as well as the alternative aircraft investigated will land at Phillips Army Airfield. GOV will transport the passengers to meeting place. The following costs are derived from study performed by Cost Analysis Division, ARRADCOM.

GOV operation & maintenance cost (approximately) \$0.85/mi.

GOV Costs

25 mi @ \$.85/mi \$21.25

Unproductive Duty Time

(1400 hrs - 1630 hrs) 2.5 hrs

Average rate of pay/overhead for GS-9 - GS-15 ARRADCOM

\$35.80/hr

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

Per Diem

Per Diem is charged since TDY takes more than 10 hrs. There is no lodging included in this estimate.

3 quarters @ \$23/day

Total Per Diem \$17.25

<u>UH-1H</u>	<u>Per Diem</u>	<u>Mileage 1/</u>	<u>Opportunity Cost TDY</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
pass. 1	\$17.25	\$28.00	\$89.50	\$848	\$982.75	\$ 982.75
pass. 2	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1096.25
pass. 3	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1209.75
pass. 4	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1323.25
pass. 5	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1436.75
pass. 6	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1550.25
pass. 7	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1663.75
pass. 8	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1777.25
pass. 9	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1890.75
pass.10	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$2004.25

1/ Total GOV mileage and flight costs are incurred by passenger 1.

AIRCRAFT (cont)

B. Travel by C12D fixed wing, seating capacity - 8.

Scenario

Leave home in POV 0640 hrs, day 1.
Arrive Morristown Airport 0710 hrs, day 1.
Leave Morristown Airport 0725 hrs, day 1.
Arrive Phillips Army Airfield, 0800 hrs, day 1.
Meeting 0900 hrs to 1400 hrs, day 1.
Leave APG 1430 hrs, day 1.
Arrive Morristown Airport 1505 hrs, day 1.
Mission Complete 1540 hrs, day 1.

Aircraft Costs

Morristown Airport to Phillips Army Airfield & Return
120 nautical miles to APG in .6 hrs @\$299/hr = \$179.40
Round Trip = \$358.80

Mileage Costs

POV mileage costs to Morristown Airport & Return
(approximately) 30 mi @\$.225/mi = \$6.75

GOV costs from Phillips Army Airfield
to meeting & return \$21.25

Per Diem

No per diem is charged since TDY takes less than 10 hrs & there are no lodging costs.

Unproductive Duty Time

Day 1 (1400 hrs - 1630 hrs) = 2.5 hrs

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

<u>C12D</u>	<u>Per Diem</u>	<u>Mileage 1/</u>	<u>Opportunity Cost TDY</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
Pass.1	0	\$28.00	\$89.50	\$358.80	\$476.30	\$ 476.30
Pass.2	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 572.55
Pass.3	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 668.80
Pass.4	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 765.05
Pass.5	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 861.30
Pass.6	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 957.55
Pass.7	0	\$ 6.75	\$89.50	0	\$ 96.25	\$1053.80
Pass.8	0	\$ 6.75	\$89.50	0	\$ 96.25	\$1150.05

1/ Total GOV mileage costs and flight costs are incurred by passenger 1.

AIRCRAFT (cont)

C. Travel by YU21 fixed wing, seating capacity - 4.

Scenario

Leave home in POV 0630 hrs, day 1.
Arrive Morristown Airport 0700 hrs, day 1.
Leave Morristown Airport 0715 hrs, day 1.
Arrive Phillips Army Airfield, 0800 hrs, day 1.
Meeting 0900 hrs to 1400 hrs, day 1.
Leave APG 1430 hrs, day 1.
Arrive Morristown Airport 1520 hrs, day 1.
Mission Complete 1600 hrs, day 1.

Aircraft Costs

Morristown Airport to Phillips Army Airfield & Return
120 nautical miles to APG in .8 hrs @ \$210/hr = \$168.00
Round Trip = \$336.00

Mileage Costs

POV costs to Morristown Airport & Return
30 mi @ \$.225/mi (approximately) \$ 6.75
GOV costs from Phillips Army Airfield
to meeting & return \$21.25

Per Diem

No per diem is charged since TDY takes less than 10 hrs & no lodging is needed.

Unproductive Duty Time

Day 1 (1400 hrs - 1630 hrs) = 2.5 hrs

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

<u>YU21</u>	<u>Per Diem</u>	<u>Mileage 1/</u>	<u>Opportunity Cost TDY</u>	<u>Flight 1/ Cost</u>	<u>Total</u>	
					<u>Net \$</u>	<u>Cum \$</u>
Pass. 1	0	\$28.00	\$89.50	\$336	\$453.50	\$453.50
Pass. 2	0	\$ 6.75	\$89.50	0	\$ 96.25	\$549.75
Pass. 3	0	\$ 6.75	\$89.50	0	\$ 96.25	\$646.00
Pass. 4	0	\$ 6.75	\$89.50	0	\$ 96.25	\$742.25

1/ Total GVO mileage and flight costs are incurred by passenger 1.

ANALYSIS II

ARRADCOM (DOVER SITE)

TO

WATERVLIET ARSENAL, NEW YORK

The following analyzes the costs involved in travel to a meeting at Watervliet Arsenal for a number of employees ranging from one to ten. This meeting will begin at 0900 hrs. and conclude business at 1400 hrs the same day. Costs of travel by Command aircraft, privately owned vehicle and rental car are considered. Assume travel by either mode of automobile will necessitate arriving at TDY the night before the meeting. The supporting rationale represents costs for each mode of transportation.

<u>Number of Passengers</u>	<u>POV</u>	<u>Rental Car</u>	<u>UH-1H</u>	<u>C12D</u>	<u>YU21</u>
1	\$ 380	\$ 420	\$ 962	\$ 501	\$ 478
2	\$ 673	\$ 730	\$1075	\$ 608	\$ 586
3	\$ 963	\$1037	\$1189	\$ 716	\$ 693
4	\$1252	\$1345	\$1302	\$ 824	\$ 801
5	\$1632	\$1765	\$1416	\$ 932	N/A
6	\$1925	\$2075	\$1529	\$1039	N/A
7	\$2215	\$2382	\$1643	\$1147	N/A
8	\$2505	\$2690	\$1756	\$1255	N/A
9	\$2884	\$3110	\$1870	N/A	N/A
10	\$3178	\$3420	\$1983	N/A	N/A

NOTE: The least expensive single mode of transportation for 2, 3, and 4 day meetings is presented in the following table*:

<u>Number of Passengers</u>	<u>2 day meeting</u>	<u>3 day meeting</u>	<u>4 day meeting</u>
1	POV	POV	POV
2	POV	POV	POV
3	POV	POV	POV
4	YU21	POV	POV
5	C12D	C12D	C12D
6	C12D	C12D	C12D
7	C12D	C12D	C12D
8	C12D	C12D	C12D
9	POV**	POV**	POV**
10	POV**	POV**	POV**

*Additional assumptions for the 2 to 4 day meetings are: 1) the command aircraft would require an additional round trip where no passengers were transported and 2) rental cars are authorized for employees traveling by aircraft.

**Combination of C12D & YU21 aircraft is less expensive.

SUPPORTING RATIONALE

ARRADCOM (Dover Site) to Watervliet Arsenal

1. PRIVATELY OWNED VEHICLE

Scenario

Driver alone or with one or more passengers leaves ARRADCOM 1300 hrs, day 1.

Arrive Watervliet Arsenal 1630 hrs, day 1.
Meeting 0900 hrs to 1400 hrs, day 2.

One Way Travel

169 mi

50 mi/hr = 3.5 hrs

Leave Watervliet Arsenal 1430 hrs, day 2.
Driver alone:

Mission Complete 1800 hrs, day 2.

Driver with 1 or more passengers:

Arrive ARRADCOM 1800 hrs, day 2 (drop off passengers).

Mission Complete 1845 hrs, day 2.

POV Mileage costs & tolls

ARRADCOM to Watervliet Arsenal & Return (approximately)	338 mi
In & Around TDY (approximately)	<u>30 mi</u>

Driver Alone: Total Miles	368 mi
---------------------------	--------

Driver with 1 or more passengers:	
-----------------------------------	--

ARRADCOM to home	<u>15 mi</u>
------------------	--------------

Total Miles	383 mi
-------------	--------

Driver Alone	368 mi @ \$.225/mi	\$82.80
--------------	--------------------	---------

Driver with 1 or more passengers	383 mi @ \$.225/mi	\$86.18
----------------------------------	--------------------	---------

Toll Cost (round trip) (approximately)	\$ 7.00
--	---------

Total Mileage cost & tolls	
----------------------------	--

Driver Alone	\$89.80
--------------	---------

Driver with 1 or more passengers:	\$93.18
-----------------------------------	---------

Per Diem

Watervliet Arsenal does not have government quarters
available for civilian personnel on TDY

Per Diem rate	\$50/day
6 quarters @ \$50/day	\$75

Unproductive Duty Time

Day 1 (1300 hrs - 1630 hrs)	3.5 hrs
Day 2 (1400 hrs - 1630 hrs)	2.5 hrs
	<u>6.0 hrs</u>

Average Rate of Pay/Overhead for GS-9 - GS-15 ARRADCOM

Average Pay (Including Fringe)	= \$20.50/hr
Overhead	<u>\$15.30/hr</u>
Total	\$35.80/hr

Opportunity Cost of TDY

Unproductive time x Average Pay/Overhead GS9-GS15
6 hrs @\$35.80/hr = \$214.80

<u>Private Vehicle 1</u>	<u>Per Diem</u>	<u>Mileage ^{1/} & Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total NET \$</u>	<u>Total Cum \$</u>
Driver	\$75.00	\$89.80/93.18	\$214.80	\$379.60	\$ 379.60
Passenger 1	\$75.00	0	\$214.80	\$289.80	\$ 672.78
Passenger 2	\$75.00	0	\$214.80	\$289.80	\$ 962.58
Passenger 3	\$75.00	0	\$214.80	\$289.80	\$1252.38

Private Vehicle 2

Driver	\$75.00	\$89.80/\$93.18	\$214.80	\$379.60	\$1631.98
Passenger 1	\$75.00	0	\$214.80	\$289.80	\$1925.16
Passenger 2	\$75.00	0	\$214.80	\$289.80	\$2214.96
Passenger 3	\$75.00	0	\$214.80	\$289.80	\$2504.76

Private Vehicle 3

Driver	\$75.00	\$89.80/93.18	\$214.80	\$379.60	\$2884.36
Passenger 1	\$75.00	0	\$214.80	\$289.80	\$3177.54

1/ Return mileage cost for driver will depend on presence of passengers in his car necessitating a stop at ARRADCOM before proceeding home.

2. RENTAL CAR

Scenario

Driver alone or with 1 or more passengers leaves ARRADCOM for rental agency in POV at 1230 hrs, day 1.

Leaves rental agency at 1300 hrs, day 1.

Arrives Watervliet Arsenal at 1630 hrs, day 1.

Meeting 0900 hrs to 1400 hrs, day 2.

Leaves Watervliet Arsenal at 1430 hrs, day 2.

Arrives rental agency at 1800 hrs, day 2. Driver alone:

Mission complete 1830 hrs, day 2.

Driver with 1 or more passengers:

Arrive ARRADCOM 1830 hrs, day 2 (drop off passengers)

Mission complete 1915 hrs, day 2.

Mileage Costs, Tolls, Gasoline, Rental Costs

Rental Mileage Cost

Rental agency to Watervliet Arsenal & Return (approximately)	338 mi
In & Around TDY (approximately)	30 mi
Total Rental car mileage	368 mi

Rental Rate at Salerno Pontiac \$19.95/day

Mileage Rental rate \$.19/mi after 100 mi/day

Rental Mileage Cost (2 days)

(368 mi - 200 mi) @ \$.19/mi \$31.92

Base Rental Cost 2 days = @ \$19.95/day \$39.90

New Jersey Sales Tax \$ 3.59

Gasoline Cost 368 mi $\frac{\$1.35/\text{gal}}{20 \text{ mi/gal}}$ \$24.84

Total Rental Cost \$100.25

POV Mileage Cost 1/

Driver

23/31 mi

23/31 mi @ \$.225/mi = \$5.18/\$6.98

Tolls (round trip) (approximately) \$7.00

Total POV/Rental Car Cost

Driver \$100.25 + \$5.18/\$6.98 + \$7.00 = \$112.43/114.23

Per Diem

6 quarters @ \$50/day = \$75.00

1/ Actual POV mileage will depend on presence of passengers necessitating stop at ARRADCOM before proceeding home.

Unproductive Duty Time

Day 1 (1230 - 1630)	4.0 hrs
Day 2 (1400 - 1630)	2.5 hrs
	<u>6.5 hrs</u>

Average Rate of Pay/Overhead for GS9 - GS 15 ARRA COM

\$35.80/hr

Opportunity Cost of TDY

6.5 hrs @ \$35.80/hr = \$232.70

<u>Rental Vehicle 1</u>	<u>Per Diem</u>	<u>Rental Car, POV, Mileage, Gas, Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
Driver	\$75.00	\$112.43/114.23	\$232.70	\$420.13	\$ 420.13
Passenger 1	\$75.00	0	\$232.70	\$307.70	\$ 729.63
Passenger 2	\$75.00	0	\$232.70	\$307.70	\$1037.33
Passenger 3	\$75.00	0	\$232.70	\$307.70	\$1345.03

Rental Vehicle 2

Driver	\$75.00	\$112.43/114.23	\$232.70	\$420.13	\$1765.16
Passenger 1	\$75.00	0	\$232.70	\$307.70	\$2074.66
Passenger 2	\$75.00	0	\$232.70	\$307.70	\$2382.36
Passenger 3	\$75.00	0	\$232.70	\$307.70	\$2690.06

Rental Vehicle 3

Driver	\$75.00	\$112.43/114.23	\$232.70	\$420.13	\$3110.19
Passenger 1	\$75.00	0	\$232.70	\$307.70	\$3419.69

3. AIRCRAFT

A. Travel by UH-1H helicopter, seating capacity - 10.

Scenario

Leave home in POV at 0545 hrs, day 1.
Arrive Morristown Airport at 0615 hrs, day 1.
Leave Morristown Airport in UH-1H at 0630 hrs, day 1.
Arrive Watervliet Arsenal at 0800 hrs, day 1.
Meeting at 0900 hrs to 1400 hrs, day 1.
Leave Watervliet Arsenal at 1430 hrs, day 1.
Arrive Morristown Airport at 1600 hrs, day 1.
Mission Complete at 1630 hrs, day 1.

Aircraft Costs

Morristown Airport to Watervliet Arsenal
125 nautical miles in 1.6 hrs (one way) @\$265/hr = \$424
2 trips @ \$424./trip = \$848

Mileage Costs

POV mileage cost to Morristown Airport & Return
(approximately) 30 mi @\$.225/mi = \$6.75

The UH-1H will land directly at Watervliet Arsenal.
Therefore there are no transportation costs to meeting place.

Unproductive Duty Time

(1400 hrs - 1630 hrs) 2.5 hrs

Average rate of pay/overhead for GS-9 - GS-15 ARRADCOM

\$35.80/hr

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

Per Diem

Per Diem is charged since TDY takes more than 10 hrs. There is no lodging included in this estimate.

3 quarters @ \$23/day

Total Per Diem \$17.25

<u>UH-1H</u>	<u>Per Diem</u>	<u>POV Mileage</u>	<u>Opportunity Cost TDY</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Cost TDY Cum \$</u>
pass. 1	\$17.25	\$ 6.75	\$89.50	\$848	\$961.50	\$ 961.50
pass. 2	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1075.00
pass. 3	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1188.50
pass. 4	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1302.00
pass. 5	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1415.50
pass. 6	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1529.00
pass. 7	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1642.50
pass. 8	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1756.00
pass. 9	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1869.50
pass.10	\$17.25	\$ 6.75	\$89.50	0	\$113.50	\$1983.00

1/ Total flight costs are incurred by passenger 1.

AIRCRAFT (cont)

B. Travel by C12D fixed wing, seating capacity - 8.

Scenario

Leave home in POV 0620 hrs, day 1.
Arrive Morristown Airport 0650 hrs, day 1.
Leave Morristown Airport 0705 hrs, day 1.
Arrive Albany County Airport, 0740 hrs, day 1.
Arrive via GOV Watervliet Arsenal 0815 hrs, day 1.
Meeting 0900 hrs to 1400 hrs, day 1.
Leave Watervliet Arsenal 1430 hrs, day 1.
Leave Albany County Airport 1515 hrs, day 1.
Arrive Morristown Airport 1605 hrs, day 1.
Mission Complete 1635 hrs, day 1.

Aircraft Costs

Morristown Airport to Albany County Airport & Return

125 nautical miles to Albany in .6 hrs @\$299/hr = \$179.40
Round Trip = \$358.80

Mileage Costs

POV mileage costs to Morristown Airport & Return

(approximately) 30 mi @\$.225/mi = \$6.75

GOV costs from Albany County Airport
to meeting & return (approximately)

40mi @\$.85/mi = \$34.00

Per Diem

Per diem is charged since TDY takes more than 10 hrs.

There is no lodging included in this estimate.

2 quarters @\$23./day
Total Per Diem \$11.50

AIRCRAFT (cont)

Unproductive Duty Time

Day 1 (1400 hrs - 1630 hrs) = 2.5 hrs

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

<u>CI2D</u>	<u>Per Diem</u>	<u>Mileage 1/</u>	<u>Opportunity Costs TDY</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Cost TDY Cum \$</u>
Pass.1	11.50	\$40.75	\$89.50	\$358.80	\$500.55	\$ 500.55
Pass.2	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 608.30
Pass.3	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 716.05
Pass.4	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 823.80
Pass.5	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 931.55
Pass.6	11.50	\$ 6.75	\$89.50	0	\$107.75	\$1039.30
Pass.7	11.50	\$ 6.75	\$89.50	0	\$107.75	\$1147.05
Pass.8	11.50	\$ 6.75	\$89.50	0	\$107.75	\$1254.80

1/ Total GOV mileage costs and flight costs are incurred by passenger 1.

AIRCRAFT (cont)

C. Travel by YU21 fixed wing, seating capacity - 4.

Scenario

Leave home in POV at 0600 hrs, day 1.
Arrive Morristown Airport 0630 hrs, day 1.
Leave Morristown Airport 0700 hrs, day 1.
Arrive Albany County Airport 0745 hrs, day 1.
Arrive Watervliet Arsenal 0810 hrs, day 1.
Meeting 0900 hrs to 1400 hrs, day 1.
Leave Watervliet Arsenal 1430 hrs, day 1.
Leave Albany County Airport 1510 hrs, day 1.
Arrive Morristown Airport 1600 hrs, day 1.
Mission complete 1630 hrs, day 1.

Aircraft Costs

Morristown Airport to Albany County Airport & Return
125 nautical miles to Albany in .8 hrs @ \$210/hr = \$168
round trip = \$336

Mileage Costs

POV costs to Morristown Airport & Return
30 mi @ \$.225/mi (approximately) \$ 6.75
GOV costs from Albany County Airport \$34.00
to meeting & return (approximately)

Per Diem

Per Diem is charged since TDY takes more than 10 hrs.
There is no lodging costs included in this estimate.

2 quarters @ \$23/day
Total per diem \$11.50

Unproductive Duty Time

Day 1 (1400 hrs - 1630 hrs) 2.5 hrs

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

<u>YU21</u>	<u>Per Diem</u>	<u>Mileage 1/</u>	<u>Opportunity Cost TDY</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
Pass.1	11.50	\$40.75	\$89.50	\$336	\$477.75	\$ 477.75
Pass.2	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 585.50
Pass.3	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 693.25
Pass.4	11.50	\$ 6.75	\$89.50	0	\$107.75	\$ 801.00

1/ Total GOV mileage costs and flight costs are incurred by passenger 1.

ANALYSIS III

ARRADCOM (DOVER SITE)

TO

FT. MONMOUTH, NEW JERSEY

The following analyzes the costs involved in travel to a meeting at Ft. Monmouth for a number of employees ranging from one to ten. This meeting will begin at 0900 hrs. and conclude business at 1400 hrs the same day. Costs of travel by Command aircraft, privately owned vehicle and rental car are considered. The fixed winged aircraft are not used for travel to Ft. Monmouth. The supporting rationale represents costs for each mode of transportation.

Number of Passengers	POV	Rental Car	(Morristown Airport) UH-1H	(ARRADCOM) UH-1H
1	\$ 124	\$ 163	\$ 361	\$ 319
2	\$ 270	\$ 284	\$ 458	\$ 372
3	\$ 385	\$ 399	\$ 554	\$ 426
4	\$ 499	\$ 513	\$ 650	\$ 480
5	\$ 623	\$ 677	\$ 746	\$ 534
6	\$ 769	\$ 797	\$ 843	\$ 587
7	\$ 884	\$ 912	\$ 939	\$ 641
8	\$ 998	\$1026	\$1035	\$ 695
9	\$1122	\$1190	\$1131	\$ 748
10	\$1269	\$1310	\$1228	\$ 802

NOTE: Extrapolation of the data for 2,3, and 4 day meetings indicates the least expensive mode of transportation for any number of employees ranging from 1 to 10 to be POV. Additional assumptions for the 2 to 4 day meetings are: 1) the command aircraft would require an additional round trip where no passengers were transported and 2) rental cars are authorized for employees traveling by aircraft.

SUPPORTING RATIONALE

ARRADCOM (Dover Site) to Ft. Monmouth

1. PRIVATELY OWNED VEHICLE

Scenario

Driver alone leaves residence 0700 hrs.

Driver with passengers:

leaves residence 0615 hrs.

arrives ARRADCOM 0645 hrs (pick up passengers).

leaves ARRADCOM 0700 hrs.

Arrive Ft. Monmouth 0830 hrs.

Meeting 0900 hrs to 1400 hrs.

Leave Ft. Monmouth 1430 hrs.

Driver alone: Mission Complete 1600 hrs.

Driver with passengers:

Arrive ARRADCOM 1600 hrs (drop off passengers).

Mission complete 1645 hrs.

One Way Travel

$$\frac{68 \text{ mi}}{50 \text{ mi/hr}} = 1.5 \text{ hrs}$$

POV Mileage costs & tolls

Residence to Ft. Monmouth & Return (approximately) 136 mi
In & Around TDY (approximately) 10 mi

Driver Alone: Total Miles 146 mi

Driver with 1 or more passengers:

Residence to ARRADCOM & Return 30 mi

Total Miles 176 mi

Driver Alone 146 mi @ \$.225/mi \$32.85

Driver with 1 or more passengers
176 mi @ \$.225/mi \$39.60

Toll Cost (round trip) (approximately) \$ 1.60

Total Mileage cost & tolls

Driver Alone \$34.45

Driver with 1 or more passengers: \$41.20

Per Diem

When traveling alone the driver would be away from home less than 10 hours and would not be entitled to per diem. When traveling with passengers, driver and passengers would receive per diem since the duration of the trip would be in excess of 10 hours.

Ft. Monmouth is a high cost area. Meals are estimated at \$25 for the day.

Unproductive Duty Time

(1400 hrs - 1630 hrs) 2.5 hrs

Average Rate of Pay/Overhead for GS-9 - GS-15 ARRADCOM

Average Pay (Including Fringe)	= \$20.50/hr
Overhead	<u>\$15.30/hr</u>
Total	\$35.80/hr

Opportunity Cost of TDY

Unproductive time x Average Pay/Overhead GS9-GS15
2.5 hrs @\$35.80/hr = \$ 89.50

<u>Private Vehicle 1</u>	<u>Per Diem</u>	<u>Mileage ¹/ & Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total NET</u>	<u>Total Cum \$</u>
Driver	0/\$25.00	\$34.45/41.20	\$ 89.50	\$123.95	\$ 123.95
Passenger 1	\$25.00	0	\$ 89.50	\$114.50	\$ 270.20
Passenger 2	\$25.00	0	\$ 89.50	\$114.50	\$ 384.70
Passenger 3	\$25.00	0	\$ 89.50	\$114.50	\$ 499.20

Private Vehicle 2

Driver	0/\$25.00	\$34.45/\$41.20	\$ 89.50	\$123.95	\$ 623.15
Passenger 1	\$25.00	0	\$ 89.50	\$114.50	\$ 769.40
Passenger 2	\$25.00	0	\$ 89.50	\$114.50	\$ 883.90
Passenger 3	\$25.00	0	\$ 89.50	\$114.50	\$ 998.40

Private Vehicle 3

Driver	0/\$25.00	\$34.45/41.20	\$ 89.50	\$123.95	\$1122.35
Passenger 1	\$25.00	0	\$ 89.50	\$114.50	\$1268.60

1/Return mileage cost for driver will depend on presence of passengers in his car necessitating a stop at ARRADCOM before proceeding home.

2. RENTAL CAR

Car Rental Services are not available before 0800 hrs. Attending a 0900 hr meeting at Ft. Monmouth would require pick-up of the rental car on the eve of the meeting.

Scenario

Driver alone leaves residence 0700 hrs.

Driver with passengers:

leaves residence 0615 hrs.

arrives ARRADCOM 0645 hrs (pick up passengers).

leaves ARRADCOM 0700 hrs.

Arrive Ft. Monmouth 0830 hrs.

Meeting 0900 hrs to 1400 hrs.

Leave Ft. Monmouth 1430 hrs.

Driver alone:

Arrive car rental agency 1600 hrs.

Mission complete 1700 hrs.

Driver with passengers:

Arrive ARRADCOM 1600 hrs (drop off passengers).

Leave ARRADCOM 1615 hrs.

Arrive Rental Agency 1645 hrs.

Mission Complete 1745 hrs.

Mileage Costs, Tolls, Gasoline, Rental Costs

	<u>Driver Alone</u>	<u>With Passengers</u>
Rental Mileage		
Rental agency to Residence	15mi	15mi
Residence to ARRADCOM	0	15mi
Round Trip to Ft. Monmouth	136mi	136mi
In & Around TDY	10mi	10mi
ARRADCOM to Rental Agency	0	8mi
TOTAL (approximately)	161mi	184mi

Rental Cost

Rental Rate \$19.95/day

Mileage Rate \$.19 after 100mi/day

	<u>Driver Alone</u>	<u>With Passengers</u>
Rental Cost	\$19.95	\$19.95
Mileage Cost	11.59	15.96
New Jersey Sales Tax	1.58	1.80
Gas @ \$1.35/gal & 20mi/gal	10.87	12.42
TOTAL	43.99	50.13

POV Mileage Cost
Driver

15 mi @\$.225/mi = \$3.38

Tolls (round trip)

\$1.60

Total POV/Rental Car Cost

Driver \$ 43.99/\$50.13 + \$3.38 + \$1.60 = \$48.97/\$55.11

Per Diem

Ft. Monmouth is a high cost area. Meals are estimated at \$25 for the day.

Unproductive Duty Time

(1400 - 1630)

2.5 hrs

Average Rate of Pay/Overhead for GS9 ~ GS 15 ARADCOM

\$35.80/hr

Opportunity Cost of TDY

2.5 hrs @\$35.80/hr = \$ 89.50

<u>Rental Vehicle 1</u>	<u>Per Diem</u>	<u>Rental Car, POV Mileage, Gas, Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
Driver	\$25.00	\$ 48.97/55.11	\$ 89.50	\$163.47	\$ 163.47
Passenger 1	\$25.00	0	\$ 89.50	\$114.50	\$ 284.11
Passenger 2	\$25.00	0	\$ 89.50	\$114.50	\$ 398.61
Passenger 3	\$25.00	0	\$ 89.50	\$114.50	\$ 513.11

Rental Vehicle 2

Driver	\$25.00	\$ 48.97/55.11	\$ 89.50	\$163.47	\$ 676.58
Passenger 1	\$25.00	0	\$ 89.50	\$114.50	\$ 797.22
Passenger 2	\$25.00	0	\$ 89.50	\$114.50	\$ 911.72
Passenger 3	\$25.00	0	\$ 89.50	\$114.50	\$1026.22

Rental Vehicle 3

Driver	\$25.00	\$ 48.97/55.11	\$ 89.50	\$163.47	\$1189.69
Passenger 1	\$25.00	0	\$ 89.50	\$114.50	\$1310.33

3. AIRCRAFT

- A. Travel by UH-1H helicopter, seating capacity - 10 (From Morristown Airport)

Scenario

Leave home in POV at 0645 hrs.
Arrive Morristown Airport at 0715 hrs.
Leave Morristown Airport in UH-1H at 0730 hrs.
Arrive Ft. Monmouth at 0800 hrs.
Meeting at 0900 hrs to 1400 hrs.
Leave Ft. Monmouth at 1430 hrs.
Arrive Morristown Airport at 1500 hrs.
Mission Complete at 1530 hrs.

Aircraft Costs

Morristown Airport to Ft. Monmouth

50 nautical miles in .5 hrs (one way) @\$265/hr = \$132.50
2 trips @ \$132.50/trip = \$265

Mileage Costs

POV mileage to Morristown Airport & Return

30 mi. @\$.225/mi = \$6.75

The UH-1H will land directly at Ft. Monmouth.

Therefore there are no transportation costs to meeting place.

Average rate of pay/overhead for GS-9 - GS-15 ARRADCOM

\$35.80/hr

Opportunity Cost of TDY

(1400-1630hrs) 2.5 hrs @ \$35.80/hr = \$89.50

Per Diem

No per Diem is charged since TDY takes less than 10 hrs.

<u>UH-1H</u>	<u>Per Diem</u>	<u>POV Mileage</u>	<u>Opportunity Cost Tdy</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
pass. 1	0	\$ 6.75	\$89.50	\$265	\$361.25	\$ 361.25
pass. 2	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 457.50
pass. 3	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 553.75
pass. 4	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 650.00
pass. 5	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 746.25
pass. 6	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 842.50
pass. 7	0	\$ 6.75	\$89.50	0	\$ 96.25	\$ 938.75
pass. 8	0	\$ 6.75	\$89.50	0	\$ 96.25	\$1035.00
pass. 9	0	\$ 6.75	\$89.50	0	\$ 96.25	\$1131.25
pass.10	0	\$ 6.75	\$89.50	0	\$ 96.25	\$1227.50

1/Total flight cost are incurred by passenger 1.

AIRCRAFT

B. Travel by UH-1H helicopter, seating capacity - 10 (From ARRADCOM)

Scenario

Leave home in POV at 0645 hrs.
Arrive ARRADCOM at 0715 hrs.
Leave ARRADCOM in UH-1H at 0830 hrs.
Arrive Ft. Monmouth at 0800 hrs.
Meeting at 0900 hrs to 1400 hrs.
Leave Ft. Monmouth at 1430 hrs.
Arrive ARRADCOM at 1500 hrs.
Mission Complete at 1530 hrs.

Aircraft Costs

ARRADCOM to Ft. Monmouth
50 nautical miles in .5 hrs (one way) @\$265/hr = \$132.50
2 trips @ \$132.50/trip = \$265

Mileage Costs - None

The UH-1H will land directly at Ft. Monmouth.
Therefore there are no transportation costs to meeting place.

Average rate of pay/overhead for GS-9 - GS-15 ARRADCOM

\$35.80/hr

Opportunity Cost of TDY

(1400-1530hrs) 1.5 hrs @ \$35.80/hr = \$53.70

Per Diem

No per Diem is charged since TDY takes less than 10 hrs.

<u>UH-1H</u>	<u>Per Diem</u>	<u>POV Mileage</u>	<u>Opportunity Cost Tdy</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
pass. 1	0	0	\$53.70	\$265	\$318.70	\$ 318.70
pass. 2	0	0	\$53.70	0	\$ 53.70	\$ 372.40
pass. 3	0	0	\$53.70	0	\$ 53.70	\$ 426.10
pass. 4	0	0	\$53.70	0	\$ 53.70	\$ 479.80
pass. 5	0	0	\$53.70	0	\$ 53.70	\$ 533.50
pass. 6	0	0	\$53.70	0	\$ 53.70	\$ 587.20
pass. 7	0	0	\$53.70	0	\$ 53.70	\$ 640.90
pass. 8	0	0	\$53.70	0	\$ 53.70	\$ 694.60
pass. 9	0	0	\$53.70	0	\$ 53.70	\$ 748.30
pass.10	0	0	\$53.70	0	\$ 53.70	\$ 802.00

1/Total flight cost are incurred by passenger 1.

ANALYSIS IV
ARRADCOM (DOVER SITE)

TO

DARCOM, WASHINGTON D.C. AREA

The following analyzes the costs involved in travel to a meeting at DARCOM for a number of employees ranging from one to ten. This meeting will begin at 0900 hrs. and conclude business at 1400 hrs the same day. Costs of travel by Command aircraft, privately owned vehicle and rental car are considered. Assume travel by either mode of automobile will necessitate arriving at TDY the night before the meeting. The supporting rationale represents costs for each mode of transportation.

<u>Number of Passengers</u>	<u>POV</u>	<u>Rental Car</u>	<u>UH-1H</u>	<u>C12D</u>	<u>YU21</u>
1	524	572	1654	582	553
2	919	983	1797	715	687
3	1310	1392	1940	848	820
4	1701	1801	2084	982	953
5	2225	2373	2227	1115	N/A
6	2620	2784	2370	1248	N/A
7	3012	3193	2513	1381	N/A
8	3403	3603	2657	1515	N/A
9	3927	4174	2800	N/A	N/A
10	4322	4585	2943	N/A	N/A

NOTE: Extrapolation of the data for 2,3 and 4 day meetings shows the most economical mode of transportation for 1 and 2 employees is by POV. This assumes that both employees are in the same vehicle. For 3 and 4 employees the least expensive mode of transportation is via the YU21 fixed wing. The C12D becomes least expensive for 5,6, 7 and 8 employees. Where schedules permit a combination of the C12D and YU21 aircrafts is least expensive for 9 and 10 employees. Otherwise the POV is most economical for this special case. An assumption for the 2,3 and 4 day meetings is that the command aircraft would require an added round trip where no passengers were transported. Additionally, assume the costs of rented cars for employees travelling by command aircraft for 1,2,3 and 4 day meetings are included.

SUPPORTING RATIONALE

ARRADCOM (Dover Site) to DARCOM, Washington, D.C. Area

1. PRIVATELY OWNED VEHICLE

Scenario

Driver alone or with one or more passengers leaves ARRADCOM 1030 hrs, day 1.

Arrive D.C. Area 1430 hrs, day 1.	One Way Travel
Meeting 0900 hrs to 1400 hrs, day 2.	<u>255 mi</u>
	50 mi/hr 5.5 hrs

Leave DARCOM 1430 hrs, day 2.

Driver alone:

Mission Complete 2000 hrs, day 2.

Driver with 1 or more passengers:

Arrive ARRADCOM 2000 hrs, day 2 (drop off passengers).

Mission Complete 2045 hrs, day 2.

POV Mileage costs & tolls

ARRADCOM to DARCOM & Return (approximately)	510 mi
In & Around TDY (approximately)	<u>30 mi</u>

Driver Alone: Total Miles	540 mi
---------------------------	--------

Driver with 1 or more passengers:

ARRADCOM to home	<u>15 mi</u>
Total Miles	555 mi

Driver Alone	540 mi	@\$.225/mi	\$121.50
--------------	--------	------------	----------

Driver with 1 or more passengers	555 mi	@\$.225/mi	\$124.88
----------------------------------	--------	------------	----------

Toll Cost (round trip) (approx.)	\$ 11.00
----------------------------------	----------

Total Mileage cost & tolls

Driver Alone	\$132.50
--------------	----------

Driver with 1 or more passengers:	<u>\$135.88</u>
-----------------------------------	-----------------

Per Diem

Per Diem is estimated to be \$105

Unproductive Duty Time

Day 1 (1030 hrs - 1630 hrs)	5.5 hrs
Day 2 (1400 hrs - 1630 hrs)	2.5 hrs
	<u>8.0 hrs</u>

Average Rate of Pay/Overhead for GS-9 - GS-15 ARRADCOM

Average Pay (Including Fringe)	= \$20.50/hr
Overhead	<u>\$15.30/hr</u>
Total	\$35.80/hr

Opportunity Cost of TDY

Unproductive time x Average Pay/Overhead GS9-GS15
 8 hrs @ \$35.80/hr = \$286.40

<u>Private Vehicle 1</u>	<u>Per Diem</u>	<u>Mileage 1/ & Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total NET \$</u>	<u>Total Cum \$</u>
Driver	\$105.00	\$132.50/135.88	\$286.40	\$523.90	\$ 523.90
Passenger 1	\$105.00	0	\$286.40	\$391.40	\$ 918.68
Passenger 2	\$105.00	0	\$286.40	\$391.40	\$1310.08
Passenger 3	\$105.00	0	\$286.40	\$391.40	\$1701.48

Private Vehicle 2

Driver	\$105.00	\$132.50/135.88	\$286.40	\$523.90	\$2225.38
Passenger 1	\$105.00	0	\$286.40	\$391.40	\$2620.16
Passenger 2	\$105.00	0	\$286.40	\$391.40	\$3011.56
Passenger 3	\$105.00	0	\$286.40	\$391.40	\$3402.96

Private Vehicle 3

Driver	\$105.00	\$132.50/135.88	\$286.40	\$523.90	\$3926.86
Passenger 1	\$105.00	0	\$286.40	\$391.40	\$4321.64

1/ Return mileage cost for driver will depend on presence of passengers in his car necessitating a stop at ARRADCOM before proceeding home.

2. RENTAL CAR

Scenario

Driver alone or with 1 or more passengers leaves ARRADCOM for rental agency in POV at 1000 hrs, day 1.

Leaves rental agency at 1030 hrs, day 1.

Arrives DC Area at 1630 hrs, day 1.

Meeting 0900 hrs to 1400 hrs, day 2.

Leaves DARCOM at 1430 hrs, day 2.

Arrives rental agency at 2000 hrs, day 2. Driver alone:

Mission complete 2030 hrs, day 2.

Driver with 1 or more passengers:

Arrive ARRADCOM 2030 hrs, day 2 (drop off passengers)

Mission complete 2100 hrs, day 2.

Mileage Costs, Tolls, Gasoline, Rental Costs

Rental Mileage Cost

Rental agency to DARCOM & Return (approximately) 510 mi

In & Around TDY (approximately) 30 mi

Total Rental car mileage 540 mi

Rental Rate at Salerno Pontiac \$19.95/day

Mileage Rental rate \$.19/mi after 100 mi/day

Rental Mileage Cost (2 days)

(540 mi - 200 mi) @ \$.19/mi \$64.60

Base Rental Cost 2 days = @ \$19.95 day \$39.90

New Jersey Sales Tax \$ 5.23

Gasoline Cost 540 mi \$1.35/gal \$36.45

20 mi/gal

Total Rental Cost \$146.18

POV Mileage Cost 1/

Driver

23/31 mi

23/31 mi @ .225/mi = \$5.18/\$6.98

Tolls (round trip) (approximately) \$11.00

Total POV/Rental Car Cost

Driver \$146.18 + \$5.18/\$6.98 + \$11.00 = \$162.36/164.16

Per Diem

Per Diem is estimated to be \$105

1/Actual POV mileage will depend on presence of passengers necessitating stop at ARRADCOM before proceeding home.

Unproductive Duty Time

Day 1 (1000 - 1630)	6.0 hrs
Day 2 (1400 - 1630)	2.5 hrs
	<u>8.5 hrs</u>

Average Rate of Pay/Overhead for GS9 - GS15 ARRADCOM

\$35.80/hr

Opportunity Cost of TDY

8.5 hrs @\$35.80/hr = \$304.30

<u>Rental Vehicle 1</u>	<u>Per Diem</u>	<u>Rental Car, POV, Mileage, Gas, Tolls</u>	<u>Opportunity Cost TDY</u>	<u>Total Net\$</u>	<u>Total Cum \$</u>
Driver	\$105.00	\$162.36/164.16	\$304.30	\$571.66	\$ 571.66
Passenger 1	\$105.00	0	\$304.30	\$409.30	\$ 982.76
Passenger 2	\$105.00	0	\$304.30	\$409.30	\$1392.06
Passenger 3	\$105.00	0	\$304.30	\$409.30	\$1801.36

Rental Vehicle 2

Driver	\$105.00	\$162.36/164.16	\$304.30	\$571.66	\$2373.02
Passenger 1	\$105.00	0	\$304.30	\$409.30	\$2784.12
Passenger 2	\$105.00	0	\$304.30	\$409.30	\$3193.42
Passenger 3	\$105.00	0	\$304.30	\$409.30	\$3602.72

Rental Vehicle 3

Driver	\$105.00	\$162.36/164.16	\$304.30	\$571.66	\$4174.38
Passenger 1	\$105.00	0	\$304.30	\$409.30	\$4585.48

3. AIRCRAFT

A. Travel by UH-1H helicopter, seating capacity - 10.

Scenario

Leave home in POV at 0425 hrs, day 1.
Arrive Morristown Airport at 0455 hrs, day 1.
Leave Morristown Airport in UH-1H at 0510 hrs, day 1.
Arrive Davidson at 0800 hrs, day 1.
Meeting at 0900 hrs to 1400 hrs, day 1.
Leave DARCOM at 1430, hrs day 1.
Leave Davidson at 1500 hrs, day 1.
Arrive Morristown Airport at 1750 hrs, day 1.
Mission Complete at 1820 hrs, day 1.

Aircraft Costs

Morristown Airport to Davidson Airfield
180 nautical miles in 2.85 hrs (one way) @\$265/hr = \$755.25
2 trips @ \$755.25/trip = \$1510.50

Mileage Costs

POV mileage to Morristown Airport & Return
(approximately) 30 mi. @\$.225/mi = \$6.75

Limousine Service to DARCOM and return to Davidson Airfield estimated to cost
\$12.00

Unproductive Duty Time

(1400 hrs - 1630 hrs) 2.5 hrs

Average rate of pay/overhead for GS-9 - GS-15 ARRADCOM

\$35.80/hr

Opportunity Cost of TDY

2.5 hrs @ \$35.80/hr = \$89.50

Per Diem

Per Diem is estimated to be \$35 for the day.

<u>UH-1H</u>	<u>Per Diem</u>	<u>POV mileage & Limousine Cost</u>	<u>Opportunity Cost Tdy</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
pass. 1	\$35.00	\$18.75	\$89.50	\$1510.50	\$1653.75	\$1653.75
pass. 2	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$1797.00
pass. 3	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$1940.25
pass. 4	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2083.50
pass. 5	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2226.75
pass. 6	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2370.00
pass. 7	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2513.25
pass. 8	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2656.50
pass. 9	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2799.75
pass.10	\$35.00	\$18.75	\$89.50	0	\$ 143.25	\$2943.00

1/ Flight costs are incurred by passenger 1.

AIRCRAFT

B. Travel by C12D fixed wing, seating capacity - 8.

Scenario

Leave home in POV at 0625 hrs, day 1.
Arrive Morristown Airport 0655, day 1.
Leave Morristown Airport 0710 hrs, day 1.
Arrive Davidson, 0800 hrs, day 1.
Meeting at 0900 hrs, to 1400 hrs, day 1.
Leave DARCOM 1430 hrs, day 1.
Leave Davidson 1500 hrs, day 1.
Arrive Morristown Airport 1550 hrs, day 1.
Mission Complete at 1630 hrs, day 1.

Aircraft Costs

Morristown Airport to Davidson Airfield and Return
180 nautical miles to Davidson in .75 hrs @\$299/hr = \$224.25
Round Trip = \$448.50

Mileage Costs

POV mileage costs to Morristown Airport & Return
(approximately) 30 mi @.225/mi = \$6.75

Limousine Service from Davidson to DARCOM & return estimated \$12.00

Per Diem

Per diem is charged since TDY takes 10 hrs.
Per Diem is estimated to cost \$25.00 for the day.

Unproductive Duty Time

Day 1 (1400 hrs - 1630 hrs) = 2.5 hrs

Opportunity Cost of TDY

2.5 hrs @ 35.80/hr = \$89.50

C12D	Per Diem	Mileage & Limousine Cost	Opportunity Costs TDY	Flight Cost	1/Total Net	Total Cum \$
pass. 1	\$25.00	\$18.75	\$89.50	\$ 448.50	\$ 581.75	\$ 581.75
pass. 2	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$ 715.00
pass. 3	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$ 848.25
pass. 4	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$ 981.50
pass. 5	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$1114.75
pass. 6	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$1248.00
pass. 7	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$1381.25
pass. 8	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$1514.50

1/ Flight costs are incurred by passenger 1.

AIRCRAFT

C. Travel by YU21 fixed wing, seating capacity - 4.

Scenario

Leave home in POV at 0615 hrs, day 1.
Arrive Morristown Airport 0645, day 1.
Leave Morristown Airport 0700 hrs, day 1.
Arrive Davidson, 0800 hrs, day 1.
Meeting at 0900 hrs to 1400 hrs, day 1.
Leave DARCOM 1430 hrs, day 1.
Leave Davidson 1500 hrs, day 1.
Arrive Morristown Airport 1600 hrs, day 1.
Mission Complete at 1630 hrs, day 1.

Aircraft Costs

Morristown Airport to Davidson Airfield and Return

180 nautical miles to Davidson in 1 hr @\$210/hr = \$210.00
Round Trip = \$420.00

Mileage Costs

POV costs to Morristown Airport & Return

30 mi @ \$.225/mi

\$ 6.75

Limousine costs from Davidson to meeting & return

\$12.00

Per Diem

Per diem is charged since TDY takes 10 hrs.

Per Diem is estimated to cost \$25.00 for the day.

Unproductive Duty Time

Day 1 (1400 hrs - 1630 hrs) = 2.5 hrs

Opportunity Cost of TDY

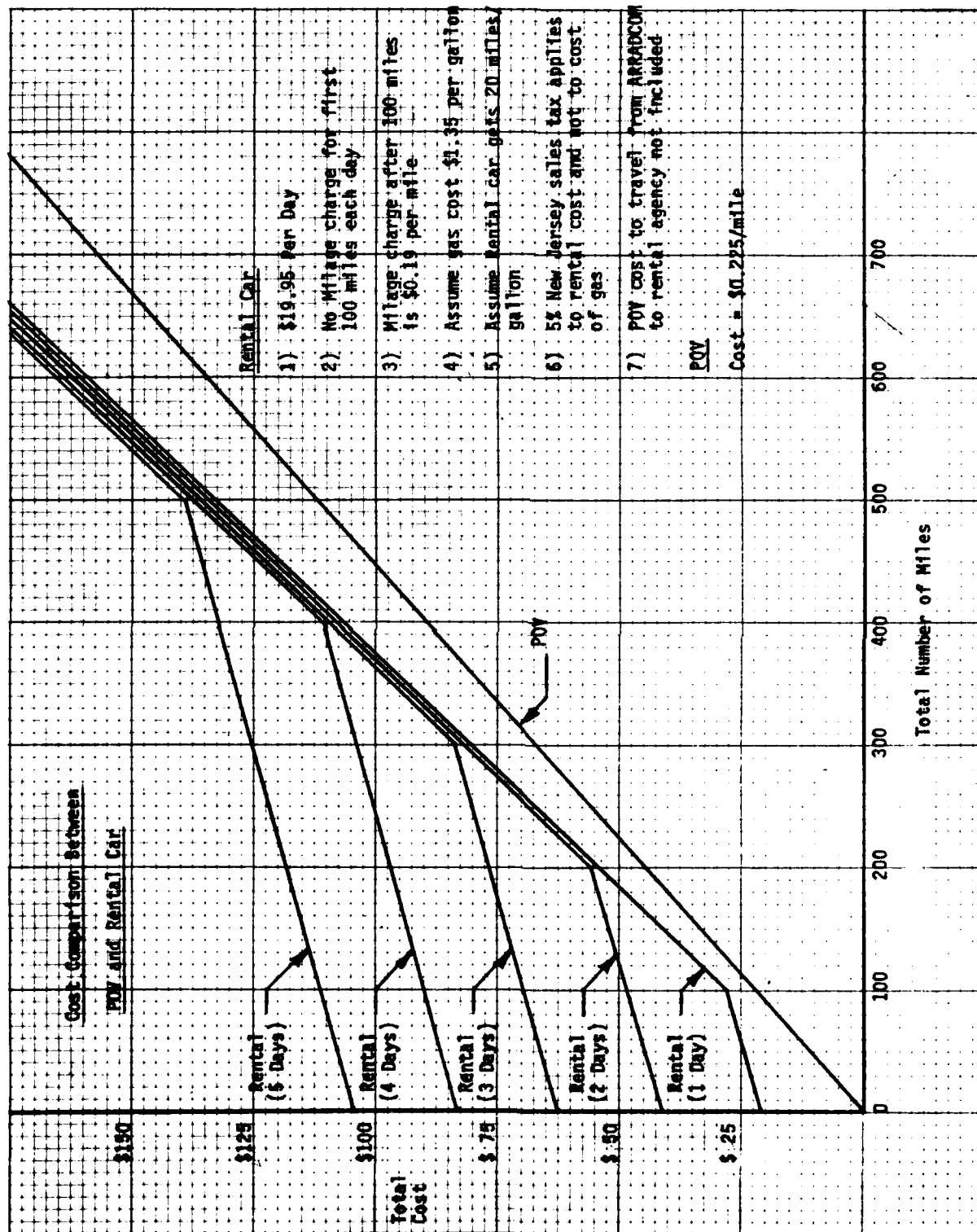
2.5 hrs @ 35.80/hr = \$89.50

<u>C12D</u>	<u>Per Diem</u>	<u>Mileage & Limousine Cost</u>	<u>Opportunity Costs TDY</u>	<u>Flight 1/ Cost</u>	<u>Total Net \$</u>	<u>Total Cum \$</u>
pass. 1	\$25.00	\$18.75	\$89.50	\$ 420.00	\$ 553.25	\$ 553.25
pass. 2	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$ 686.50
pass. 3	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$ 819.75
pass. 4	\$25.00	\$18.75	\$89.50	0	\$ 133.25	\$ 953.00

1/ Flight costs are incurred by passenger 1.

APPENDIX B

GRAPH OF POV VS RENTAL CAR



APPENDIX C

DATA SOURCES

DATA SOURCES

1. Flying distances between locations, rates of speed of the aircraft, aircraft cost of operation and driving distances from airports to TDY locations were obtained from the ARRADCOM Aviation Office.
2. Rental car rates and average gas mileage rates were obtained from Salerno Pontiac Inc.
3. Driving distances between ARRADCOM and TDY locations were obtained from the Finance & Accounting Office at ARRADCOM.
4. Fringe Benefit rate was obtained from Management Information Systems Directorate, ARRADCOM.
5. Average Overhead Rate was obtained from Comptrollers Office, ARRADCOM.
6. Average DL rate for GS9-GS15 at ARRADCOM was calculated from listing of number of employees and average pay per grade generated by Cost Analysis Division, ARRADCOM.
7. Mileage in and around TDY location, average driving distance from employees residence to ARRADCOM and cost of gasoline were based on estimates of the authors.
8. Cost of tolls were considered dependent upon route driven and were based upon estimates of the authors.
9. Per Diem rates for designated high cost areas were obtained from DF dated 25 Nov 1980, subject New Travel Rates from DRDAR-CPF.
10. Cost of government transportation was based upon a study titled "Economic Analysis of the Modes of Travel to and from Airports" prepared by the Cost Analysis Division, ARRADCOM and was considered a reasonable estimate of cost of government transportation at other government locations.

DISTRIBUTION LIST

	<u>Copies</u>
Commander	
US Army Armament Research and Development Command	
ATTN: DRDAR-CG	1
DRDAR-DCG	1
DRDAR-CS	1
DRDAR-CP	1
DRDAR-LC	1
DRDAR-MS	1
DRDAR-PM	1
DRDAR-PR	1
DRDAR-PS	1
DRDAR-PSA	5
DRDAR-QA	1
DRDAR-SC	1
DRDAR-TS	1
Dover, NJ 07801	
Defense Documentation Center	12
Cameron Station	
Alexandria, VA 22314	

DA
FILM
O-